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Globalisation, Capital Mobility and Tax Competition: Theory and Evidence for OECD Countries

Lucas Bretschger and Frank Hettich*

Abstract

Are the predictions of tax competition theory wrong? Recent empirical results on capital taxation suggest that this might be the case. While tax competition literature predicts that capital taxes decrease with increasing globalisation, empirical studies on various data find contradicting evidence. By using different data and additional elements of economic theory, this paper aims to challenge the empirical contributions. For a panel of 14 OECD countries and the period 1967-96, we find that globalisation has indeed a negative and significant impact on corporate taxes. Furthermore, globalisation tends to raise labour taxes and social expenditures. As a consequence, the so-called "efficiency" and "compensation" hypotheses of globalisation are not competing, they both appear to apply at the same time: efficiency has an impact on the tax-mix whereas compensation is provided through increased social expenditures.

JEL classification: H7, H87, C23

Keywords: Tax competition, empirical evidence, panel data, OECD countries

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1 Introduction

Following the basic results of tax competition literature, capital taxation is negatively and labour taxation is positively related to the degree of international capital mobility. Furthermore, theory suggests that larger countries levy higher tax rates than smaller countries because the erosion of their tax base is smaller in per capita terms (cf. Bucovetsky 1991 and Wilson 1991). In full accordance with microeconomic principles, these predictions are derived from general equilibrium models. It is thus very surprising that most of recent empirical studies obtain almost reverse results. For instance, in a panel regression of 15 OECD countries for the period 1976–90, Garrett (1995) finds that a rising exposure to international trade, which is used as a proxy for financial liberalisation, leads to an increase in capital taxation. Referring to cross-country studies of economic growth, Quinn (1997) considers a broader range of 64 countries with annual data averaged over the years 1974–89. He concludes that corporate taxation is positively associated with financial liberalisation under a wide variety of different model specifications. These findings are supported by Swank (1998). In a panel regression for 17 industrialised countries (mainly OECD countries) for the period 1966–93, he finds that three different measures of capital mobility are positively related to the proxy of corporate taxation.

However, a closer look at these empirical results reveals problems and possible deficiencies. For instance, the creation of a proxy for the dependent variable – the tax policy – is a major problem. Proxies commonly used in cross-country studies are the revenues of corporate taxation as a percentage of the GDP. It can be shown that this method is inadequate in several respects. In addition, it seems that the specifications of the estimated equations can be enriched with the help of economic theory.

By using effective average capital and labour tax-rates, Rodrik (1997) avoids the data problem. In a panel approach of 19 OECD countries for the period 1965–91, he finds that a proxy for openness has a significantly negative effect on capital taxes and a significantly positive effect on labour taxes. However, his results are not robust when one adds a qualitative dummy variable for international exchange rate restrictions and an interaction term of this dummy with the proxy of openness. The change in capital taxation is one of the main features in the more general discussion on the consequences of globalisation for the nation state. In their broad survey, Schulze and Ursprung (1999) consider the different links between the reduction in international arbitrage costs and fiscal policy. Their contribution covers topics such as the size of the public sector, the structure of public expenditures, the structure of taxes and

the scope of redistribution policies. The survey comments on the reviewed literature as follows: "…many of these studies find no negative relationship between globalisation and the nation's ability to conduct independent fiscal policies."[1] The authors also suggest that the different hypotheses on the effects of globalisation are not mutually exclusive. They argue that some effects apply especially to tax policy, which must be distinguished from the effects on government expenditures.

According to this assessment, the plan of this paper is to concentrate on the following issues. *First*, we show that the proxy variables for corporate taxation used by Garrett (1995) and Quinn (1997) both have conceptional difficulties and are responsible for certain counterintuitive results. Consequently, we use effective average tax rates on corporate capital with the methodology proposed in the seminal paper of Mendoza, Razin and Tesar (1994). In this way, government tax policy seems to be much better depicted as we additionally control for tax base effects. Furthermore, we distinguish precisely between the measure of globalisation and country-size. *Second*, we explicitly take into account the result of tax competition literature concerning labour taxation and the impact of country-size on the government tax policy. To show the theoretical foundation, we rely on a small theoretical model of international tax competition. *Third*, as in reality, tax policy depends on a number of additional elements, we enlarge the simple tax competition model with the issues of dynamics, political preferences and uncertainty. Furthermore, we include several sensitivity analyses to test the robustness of the estimated coefficients. We control for different macroeconomic variables, which should have an impact according to theory. *Fourth*, we use panel data for 14 OECD countries with annual frequency, covering the period from 1967 to 1996. To do so, we have collected and constructed data for Austria, Belgium, Canada, France, Germany, Greece, Italy, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States. *Fifth*, we expand our analysis of capital taxation on labour taxation and social expenditures.

The focus of this paper is to determine government tax-policy behaviour. Before we start with the econometric analyses, we describe which variables are important from a theoretical view. The main issue is capital taxation. As taxation of labour and social expenditures are linked to this topic through the government's budget constraint, further empirical results for these issues are added. The empirical results of the paper exhibit that the theoretical prediction of a negative impact of international capital mobility on corporate taxation can indeed be found in the data, once the conceptual and theoretical problems of existing studies are addressed. Furthermore, as theoretical models of tax competition predict, labour taxation is posi-

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[1] Schulze and Ursprung (1999, page 345).

tively related to increasing globalisation. Finally, we observe that government social expenditure responds positively to increasing globalisation as well. Thus, there is evidence of different hypotheses on the effects of globalisation at the same time. On the one hand, we observe a change in the tax-mix from the rather elastic corporate tax-base to the rather inelastic labour tax-base, which is a result of tax competition. On the other hand, we find increasing social expenditures, which seems to show the governments' aim to compensate for increasing risk.

The remainder of the paper is organised as follows. Section 2 presents the basic theoretical tax competition model. In addition, it enlarges the simple approach with further elements, which are important for current tax policy. In section 3, the data are described. In particular, the measurement of globalisation and capital taxation is depicted in detail. Section 4 contains the empirical results regarding the impact of globalisation on corporate taxes, labour taxes and social expenditures. Section 5 concludes.

2 Effects of Globalisation on Fiscal Policy

Globalisation has distinct effects on the tax structure and on government expenditures. With a rising degree of international integration, national governments lose parts of their monopoly power of fiscal policy. They increasingly find themselves in a situation of strategic interaction with their foreign counterparts. Furthermore, due to globalisation, uncertainty and structural adjustments within an economy increase, which may affect fiscal policy additionally. In political science literature, the effects of globalisation on fiscal policy are explained either by the so-called "efficiency hypothesis" or by the "compensation hypothesis". The efficiency hypothesis argues that governments compete for mobile factors and goods. As a consequence, it predicts an erosion of the nation state. On the other hand, the compensation hypothesis suggests that governments expand their welfare state to insure their citizens against the increased economic risk generated by globalisation (cf. Garrett and Mitchell 1998).

In section 2.1, we will first describe the efficiency view in more detail by means of the economic theory on international tax competition. To do so, we sketch the assumptions and results of a simple model. In section 2.2, we then discuss some fundamental assumptions of this model and show which variables – explaining government tax policy behaviour – should be additionally incorporated in the empirical analyses. Incorporating these new variables in our analysis, we are able to test the compensation view as well.

2.1 The Theoretical Model

In this section, we outline some basic results of the theory on international tax competition in an informal way.[2] To understand this theory and to demonstrate the underlying assumptions, we start by sketching a basic model.[3] Tax competition is just one – although important – shaping of the efficiency view. However, the basic mechanism can easily be applied to other aspects of government competition which may take place, for instance, in the form of environmental or labour-market (de)regulation and of the provision of productive public goods.

Tax competition literature focuses on the factor capital, as it is considered to be particularly mobile in the international context. Of course, national governments may also compete for mobile labour or consumers. However, whether tax competition arises depends not only on the removal of mobility restrictions on factors or consumers but also on the actual mobility of factors and of the prevailing tax system. For instance, the actual mobility of labour within the EU is low in spite of the realisation of the Common Market in 1992 which guarantees the free movement of EU citizens as well as the freedom of establishment (see Leiner 1998). And, although consumer goods are very mobile within the EU, we can exclude consumption tax competition because of the prevailing destination principle.[4]

Consider a static model with many identical countries. Each country consists of a large number of identical households, firms and a government. Within each country, perfectly competitive firms produce a single homogenous output good by using capital and labour. The output good is sold to domestic households as a consumption good and to the domestic government, which can transform it into a public good. Households own fixed endowments of capital and supply the immobile factor labour inelastically. Capital is assumed to be internationally mobile; thus households are free to invest their capital wherever they want. Assuming rational behaviour, capital moves across borders to seek the highest net-of-tax return. Households finance the consumption good with the wage and capital income, which is received from invested capital and supplied labour. The well-behaved utility function of the identical households depends positively with decreasing marginal utility on the private consumption good and the domestic public good. Each country's public good is supplied by the domestic

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2 For an excellent survey, see Wilson (1999).

3 The model described in the following is based on Zodrow and Mieszkowski (1986) and Wilson (1986).

4 Under the destination principle exports are not taxed by the exporting country but by the importing country. The origin-based taxation system is applied for cross-border shopping only. Since the share of cross-border shopping of total trade is negligible, we do not examine tax competition in the field of consumption.

government and solely financed by a capital tax according to the source principle. Thus, only the capital employed in the domestic country can be taxed.

The government is assumed to behave in an efficient manner, hence it does not overtax or waste any revenue. The government chooses the capital income tax rate and hence determines the provision of the public good by maximizing household utility, subject to its budget constraint

$$G = \tau \cdot K, \tag{1}$$

with G being the supply of the public good, τ the proportional capital tax and K the domestic capital stock. In the optimum, the government chooses the tax rate τ such that social marginal benefits from the public good MB^{soc} equal social marginal costs of tax raising MC^{soc}:

$$MB^{soc} = MC^{soc}. \tag{2}$$

To determine the components of MC^{soc}, we totally differentiate (1) to obtain

$$dG = d\tau \cdot K + \tau \cdot dK. \tag{3}$$

The first term on the rhs of (3) corresponds to the marginal individual cost of taxation MC^{priv}. It arises due to decreased after-tax income and thus lower private consumption possibilities. The second term on the rhs of (3) describes the tax-base effect of capital taxation. For a closed and static economy, this effect is absent ($dK = 0$). Hence, general optimality condition (2) results in the following optimum equation – known as the Samuelson rule:

$$MB^{soc} = MC^{priv}, \text{ with } \tau = \tau^{opt} \text{ and } G = G^{opt}. \tag{4}$$

This is a first-best result. It is assumed that the government can choose a capital income tax τ^{opt}, which allows it to provide the optimal amount of the public good G^{opt}. However, if we now allow for international capital mobility, there is a capital outflow ($dK \neq 0$) as a consequence of an increase in τ. The marginal costs of the outflow are given as second term on the rhs of (3). Thus the marginal social cost of taxation consists of the marginal individual costs MC^{priv} *and* the marginal costs of capital outflow $MC^{outfl.}$ caused by capital taxation. Thus for the open economy, the optimality condition (2) results in the following equation – known as the modified Samuelson rule:

$$MB^{soc} = MC^{priv} + MC^{outfl.}, \text{ with } \tau < \tau^{opt} \text{ and } G < G^{opt}. \tag{5}$$

Since the marginal social costs of taxation are higher for an open economy than for a closed economy, the marginal social benefits of providing the public good must be higher as well. To fulfil the second-best optimality condition, the capital income-tax rate and hence the supply of the public good are at an inefficiently low level. This is true although the government still acts optimally from a national point of view and the solution is still first best from the country's perspective. The reason for this result is that a rise in a given country's tax rate creates a positive fiscal externality. For example, for a given world capital stock, a rise in the domestic capital tax causes capital outflows and thus increases the capital tax base in all other countries. Since governments do not take this effect into account, the provision of the public good is inefficiently low.

The basic tax competition model has been extended in several ways. So far we assumed identical and atomistic countries. Bucovetsky (1991) and Wilson (1991) analyse the case where two countries of different size compete for internationally mobile capital. They show that the smaller of the two countries faces the more elastic tax base and will choose the lower capital tax rate in equilibrium. The larger country levies a higher tax rate because the erosion of its tax base is smaller in per capita terms.

Allowing, additionally, for a labour tax, a welfare-maximising government of a small open economy should finance the provision of the public good solely with this tax. This result is obvious when labour supply is fixed. By assuming internationally immobile labour and neglecting an endogenous labour-leisure decision, the labour tax possesses the properties of a lump-sum tax. However, even if the labour tax distorts the labour-leisure decision, Bucovetsky and Wilson (1991) show that the revenue needs should be met by taxing labour income only. This result is valid for small open economies. The intuition is that capital supply is infinitely elastic, whereas the labour supply elasticity is finite. However, the larger the country is, the lower the elasticity of capital supply becomes. Hence, countries with significant influence on capital supply will tax both labour and capital income.

Given these basic results of the tax competition literature, we have three testable hypotheses:

- At a given time, the more integrated a country is in the world capital market, the lower capital taxation is.
- At a given time, the more integrated a country is in the world capital market, the higher labour taxation compared to capital taxation is.
- Given a certain degree of international integration, smaller countries have lower capital tax rates than larger countries.

Before indicating additional variables which may determine government tax policy, we briefly discuss the applicability of the tax competition model to the real world. Most European countries tax *de jure* international capital streams according to the residence principle. Thus one could argue that the results of the above-described model are not relevant as the residence principle neutralises the effects of international differences in tax rates regarding the decision where to invest internationally mobile capital. However, due to limited information flows between banks and fiscal authorities, administrative problems and the lack of international treaties, the residence principle is not enforceable. Therefore, most experts agree that the present taxation of corporate profits follows *de facto* closely the source principle, see e.g. Tanzi and Bovenberg (1990), Keen (1993) and Sørensen (1995).

2.2 Additional Elements of Government Behaviour

The model of section 2.1 is embedded in a static environment. However, it seems reasonable to postulate that the economic development of an economy determines the government's tax-policy behaviour as well. To show this as simply as possible, assume a small open economy with capital taxation to take the form of a capital income tax with rate τ^*, so that the government budget constraint becomes:

$$G = \tau^* \cdot r(A, K) \cdot K \tag{6}$$

with r denoting the interest rate and A being the exogenous level of technical knowledge. According to microeconomic theory, technical progress increases the marginal product of capital and thus the interest rate, while a higher capital input has the opposite effect. However, for a small country, r is simply the world interest rate, i.e. it is given at any moment in time. Therefore, any increase in A does not increase the interest rate in the home economy, but causes an immediate capital inflow, which can be taxed to balance the domestic budget. Totally differentiating (6) gives:

$$dG = r(d\tau^* \cdot K + \tau^* \cdot dK^{outfl.} + \tau^* \cdot dK^{infl.}) \tag{7}$$

In (7), the second term on the rhs corresponds to the capital outflow given in (3). The last term is capital inflow $dK^{infl.}$ as a consequence of exogenous technical progress. To be precise, it captures the technical progress that exceeds worldwide progress. (7) says that the tax rate on capital income is lower when capital productivity *ceteris paribus* increases. That is, in this case, a lower tax rate suffices to balance the budget. As a consequence of (7), we control for the economic growth rate in the econometric analysis below.

In the optimum, the marginal benefit *(MB)* of an increase of *G* is still assumed to equal marginal costs *(MC)* of taxation, see equation (2). In the simple approach above, *MB* was determined by the household's utility function only. But assuming a benevolent dictator, maximising the welfare of the representative household neglects the political economy of tax policy. It is problematic in at least three respects. First, it does not take into account the fact that the government is no unit actor. The "government" is rather a heterogeneous group of conflicting politicians and parties in cabinet and legislative. Furthermore, pure welfare maximising does not consider the direct incentives for the government. In the first place, governments and political parties strive for maximise their re-election changes. Therefore, political decisions might not always be welfare-maximising. Finally, government behaviour may be determined by ideological preferences, as Cusack (1997) shows empirically. Following the partisan politics models, the government has a certain degree of freedom during the elected period to achieve its goals. For instance, it is supposed that leftist governments favour redistribution and thus prefer a higher level of government expenditures while conservative governments favour the untrammelled working of the market system and hence reduce government spending. As a consequence, to determine *MB*, preferences of the government also have to be considered. This will be done by a variable for the political centre of gravity on a right-left-scale.

In the model explained above – as often in economic theory – we determine equilibrium conditions and neglect uncertainty. However, in the case of globalisation and the nation state, adjustment costs and uncertainty are further issues. To consider adjustment costs, we additionally consider a partial adjustment specification of the underlying tax competition model in our econometric analyses. More precisely, the tax of period *t* is then a weighted average of the equilibrium value and the past tax rate. Regarding uncertainty, we include a variable for firm profitability. This aims to capture the impact of (unexpected) high or low profits on governments' tax decisions. Concerning public expenditures, uncertainty also plays an important role. Increasing globalisation is accompanied by many structural adjustments in the national economy. For instance, the labour intensity in production and the required labour qualification may change due to increasing globalisation. Due to natural and institutional hindrances, it is thus likely that the labour market is (additionally) distorted during the adaptation process caused by increasing globalisation. More generally, it is argued that globalisation causes rising economic risk for households and firms. The national government can insure citizens against this risk by means of certain welfare programs. That is the view of the compensation hypothesis. It suggests that governments will expand their welfare programs to insure citizens against the economic risk generated by market integration. It emphasises the political incen-

tives for governments to ameliorate the short-term distortions by market integration, as for instance in the labour market in the form of unemployment. Cameron (1978) empirically supports the compensation view. He finds a positive relation between market integration and the welfare state. Furthermore, the compensation hypothesis suggests that social welfare programs might be advantageous to make citizens support increasing globalisation (see e.g. Ruggie 1983). To incorporate this issue, we present a separate estimation for social expenditures in our study.

Summarising these enlargements of the simple theory and following the compensation view, we add the following hypotheses:

- At a given time, the higher the growth rate of a country, the lower the capital taxation.
- At a given time, the more conservative the government, the lower capital and labour taxes.
- The higher the country's integration in the world capital market is, the larger the governments' (social) expenditures become.

3 The Data

In this section we describe the data used for the econometric analyses and show trends of important variables. We concentrate on the variables for globalisation and capital taxation and relegate the description of the other variables to the appendix on page 22.

3.1 Measuring Globalisation

There is little doubt that international integration of national economies increased substantially in the considered period, i.e. from 1967 to 1996. As the degree of international capital mobility is difficult to measure, let us regard several different qualitative and quantitative variables as a proxy of international capital market integration more closely. Independent of the used variables, unweighted average data all show an increasing international integration.

Figure 1 shows two variables used in the literature for measuring international (capital) market integration. It is seen that the quantitative trade variable *openness1*, measured as the sum of exports and imports in goods and services as a proportion of GDP, scaled on the left-hand score, grew from 46 per cent in the period 67/71 to 60 per cent in the period 92/96. The variable *openness2,* scaled on the right-hand side, is a qualitative index, ranging from most closed (0) to most open (14). This variable, rising from 10 in the period 67/91 to 13 in the period 92/96, is constructed by analysing inward and outward capital and current account restrictions and by regarding international legal agreements that constrain a nation's ability to

restrict exchange and capital flows.[5] When using trade variables *openness1* or *openness2* as measure of capital market integration, we assume that economies which are more exposed to trade tend to be economies with higher capital mobility.

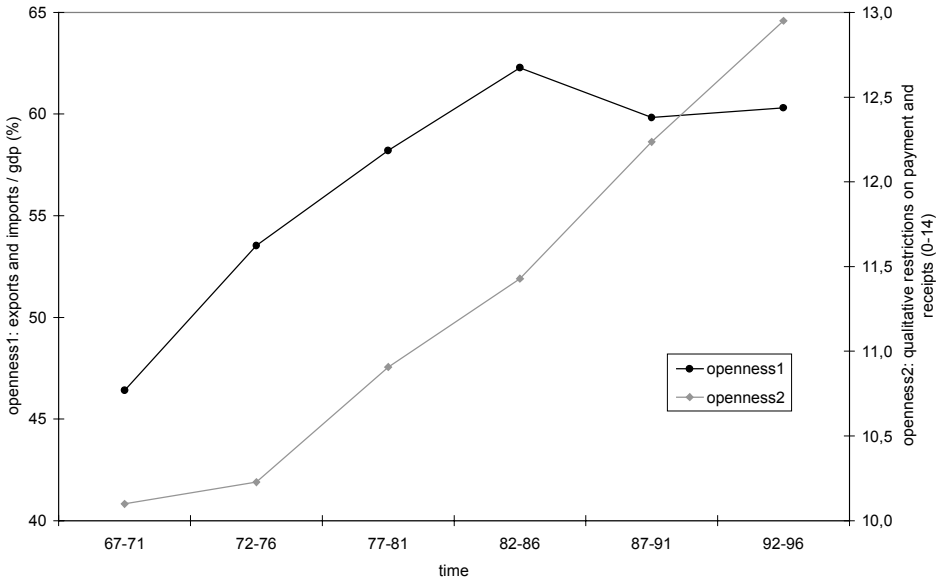

Figure 1: Market integration in goods and services, quantitative and qualitative, based on five-year unweighted averages from fourteen OECD countries

However, it should be noted that smaller countries naturally have higher trade shares than larger countries. This becomes intuitive when we think of very small countries like Luxemburg, Liechtenstein, Monaco, Singapore etc. The economic reason behind this fact is economies of scale, which lead to a higher degree of specialisation in smaller regional entities. With all consumers being eager to buy the whole range of products on world markets, a small country must then have higher trade shares. Given this fact, smaller countries tend to have higher values of the globalisation proxy *openness1* than larger countries. We correct for this bias by first performing a panel regression with *openness1* as endogenous variable and *size* as exogenous variable. Only the residuals from the average trend out of this regression are then regarded as indicators of real openness of an economy.[6] By doing so, we eliminate the size effect of our globalisation proxy *openness1*. The new variable is called *open*.

Figure 2 shows average values for the years 1992–96 of the variable *openness1* and the variable *open* for every country. The unweighted average for all countries of *openness1* and *open* is 0.603 and 0, respectively. The figure indicates the influence of a country's size on its openness. This becomes clear when we regard Sweden (S), for instance. It is seen that with a value of 0.67, the variable *openness1* indicates Sweden to be an above-average open coun-

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5 For a more detailed description of this qualitative index, see Quinn (1997).

6 We thank Peter Stalder for proposing this procedure.

try. However, eliminating the influence of the size, it can be seen that Sweden is actually a rather closed economy. The value of *open* is -0.073, i.e. below the average of all the countries. The opposite applies to the United States. This country has relatively low values for *openness1*, but nevertheless, it is an open economy according to *open*. By eliminating the influence of size in *openness1*, we are able to distinguish precisely between the actual degree of globalisation and the size of a country. This distinction is import to check the correctness of the results of the theoretical tax competition literature.

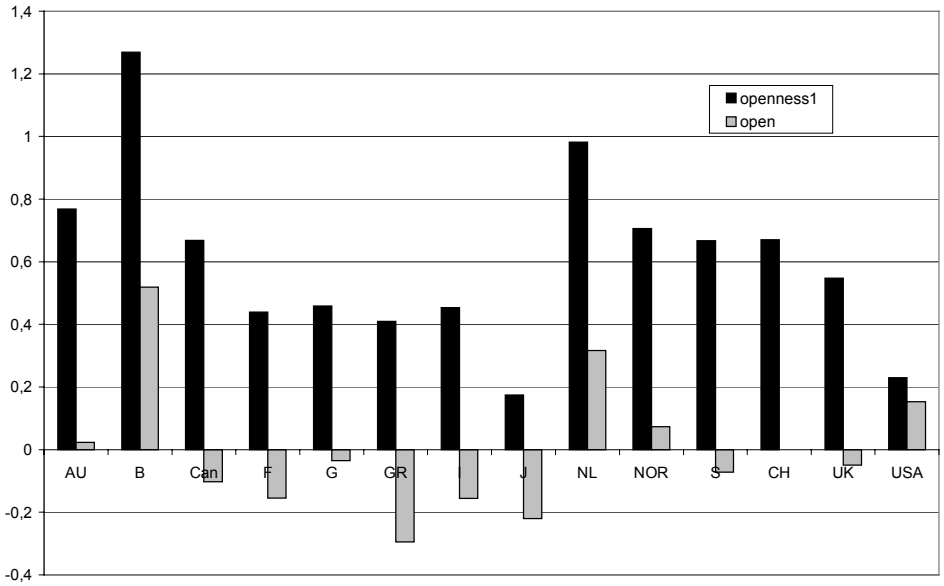

Figure 2: Elimination of size-effects in openness1

In the following, we discuss two alternative globalisation proxies. Figure 3 shows investment abroad as a percentage of GDP (variable *diinvest*) on the left-hand scale and a measure of capital account regulation, which is controlled by the respective country (variable *capital*) on right-hand scale. *Capital* is a qualitative index; its values range between 0 and 4 – 0 for strong and 4 for no capital payment restrictions.[7] The figure shows average values for all countries. We can see that investment abroad as a percentage of GDP increased from 0.66% in the period 67/71 to more than 2% in the period 92/96; however, the main rise took place between the periods 82/86 and 87/92. In contrast, the qualitative measure *capital* shows that the countries constantly abolished their capital payment restrictions during the whole time of observation.

For the following estimations, we focus on the globalisation measure *open*. This variable is based on generally accepted trade measures and corrected for the bias arising from size effects. We also used the other globalisation measures, but the results were less satisfying and

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7 For a more detailed description of this index, see Quinn (1997).

are not reported here. Concerning the variable *diinvest,* it should be noted that an adequate measure of openness should refer to the potential to move capital rather than the actual flows of direct investments abroad. For instance, in equilibrium no foreign direct investments will take place although the capital market may be fully integrated.

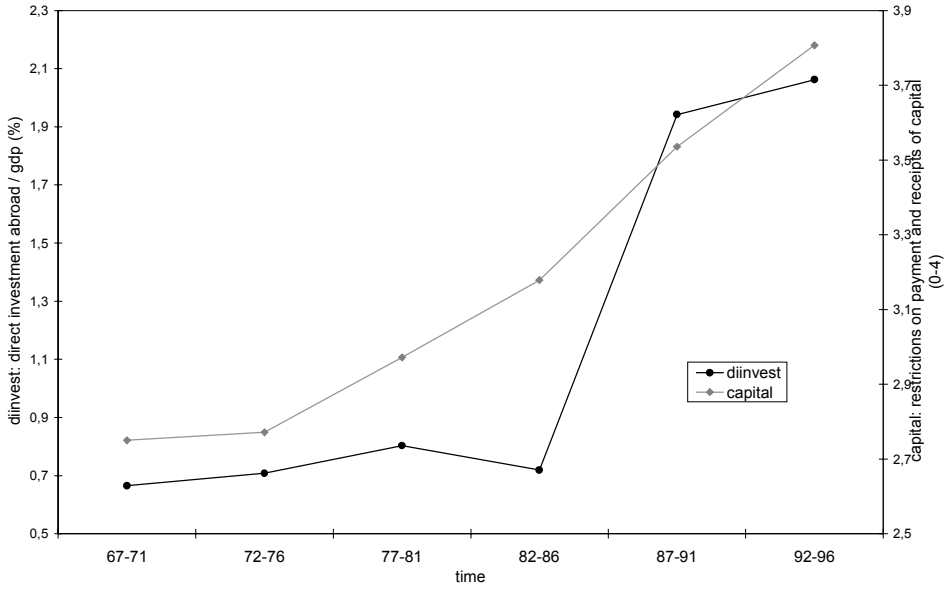

Figure 3: Capital market integration quantitative (left-hand scale) and qualitative (right-hand scale); unweighted averages from fourteen OECD countries.

3.2 Capital taxation

The selection of a proxy for the tax policy is crucial for the results. Using the most readily available measure, the statutory tax rates, is unsatisfactory for the following reason. The effective tax burden is determined not only by the statutory tax rate but also by the size of the tax base, which is influenced by different national complex tax-credits, tax-exemptions and tax-deductions.

For these reasons, proxies commonly used in cross-country studies are corporate tax revenues as a percentage of GDP, as a percentage of individual taxation or as a percentage of total taxation (see for instance Garrett 1995 and Quinn 1997). However, the mentioned proxies possess several insufficiencies as will be shown in the following: (i) The proxy corporate tax revenues as a percentage of GDP is no strategic variable of the government. The government can determine the tax burden by the corporate tax rate and the tax base but not the GDP. (ii) The average surplus of corporate enterprises – which can be seen as the actual tax base of corporate taxation – as a percentage of GDP of the investigated countries has risen from 8.21 per cent in 1980 to 9.82 per cent in 1996. This corresponds to a rise of 19.63 per cent. Since this development coincides with increasing capital market integration, the positive correlation

between the first corporate tax proxy and the proxy of capital market integration found by Garrett (1995) and Quinn (1997) may be caused solely by a rise in the corporate tax base. (iii) Another shortcoming becomes evident when we observe the strategic behaviour of multinational firms. These firms have the change to reduce their tax burden by shifting their surplus by transfer prices to a low-tax country. Imagine, for instance, that multinational firms shifted their surplus by transfer prices to Luxembourg because of a low corporate taxation. The proxy corporate taxation as a percentage of individual taxation would increase, thus characterising Luxembourg incorrectly as a high-tax country although the opposite would be correct. To avoid these problems, we use effective average tax rates calculated with the methodology proposed in the seminal paper of Mendoza, Razin and Tesar (1994). These tax rates are calculated by dividing total tax revenue from consumption, labour and capital taxation by the pre-tax consumption expenditure and pre-tax income of the respective factor. The most important tax rate for our analysis, the effective average corporate tax rate, is a subset of the effective average capital tax.

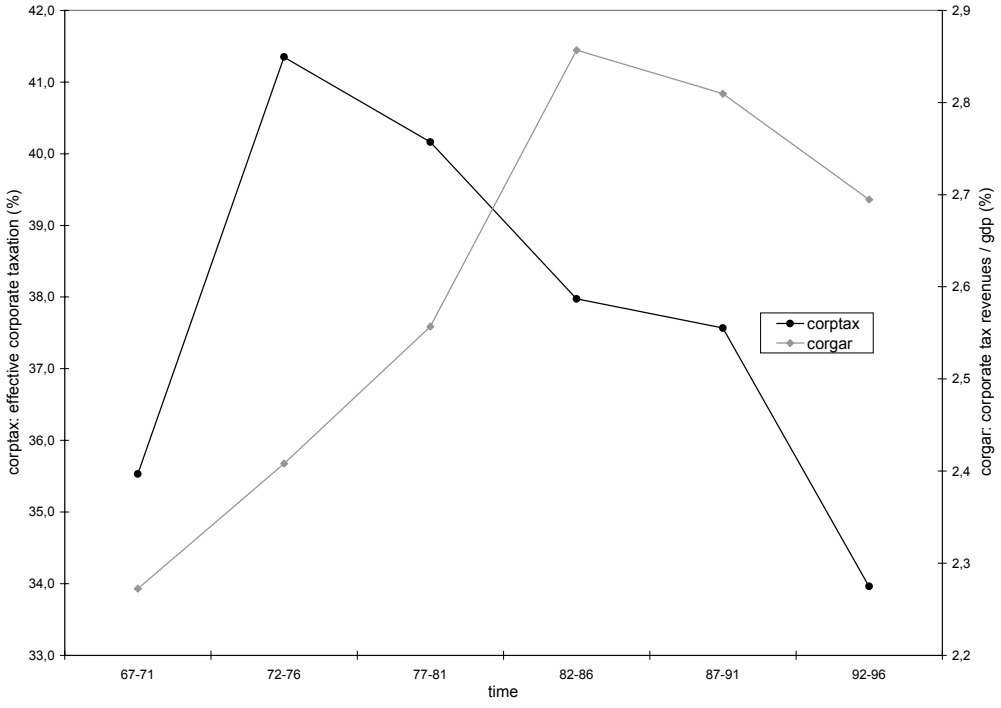

Figure 4: Measures of corporate taxation.

Figure 4 shows the contrasting developments of corporate taxation as a percentage of GDP and the effective average corporate tax rate. The unweighted effective corporate tax rate (*corptax*) for all countries sharply increases in the late sixties and early seventies to more than 41% and then constantly decreases to a level below 34% in the period 92–96. However, cor-

porate tax revenues as a percentage of GDP (*corgar*), used by Garrett (1995) and Quinn (1997), shows a totally different development.

There is a special reason for focusing on corporate taxation rather than on capital taxation. The problem with effective capital tax rates is that they incorporate taxes on immovable properties, which possess a rather inelastic tax base. Because of this immobility, these tax rates tend to rise due to globalisation, like the taxes on labour. Furthermore, since corporate capital quite often belongs to multinational firms, it seems to be much more mobile than the capital of private households and small enterprises and thus to fulfil better the assumptions of the tax competition model.

4 Evidence from Panel Data for OECD Countries

We collected annual data from 1967 to 1996 for 14 OECD countries. For estimation, we used the GLS-random-effects estimator for cross-sectional time-series regression models of the STATA software package. As an alternative, we evaluated a feasible generalised least squares procedure which allows estimation in the presence of AR(1) autocorrelation within panels or cross-sectional correlation and/or heteroscedasticity across panels. However, the latter method produced very similar results to the former so that the results of the GLS-random-effects estimator are representative.[8] To show evidence for the hypotheses of the theoretical approach, the following procedure has been adopted. For corporate and labour taxes to be the endogenous variables, we start with the core model of tax competition and then add further variables and lags as suggested in Section 2. For corporate taxes, we additionally distinguish between the equilibrium specification and the partial adjustment specification. Finally, we present some results on the determination of social expenditures. Generally, standard errors of the estimated coefficients are given in parentheses.

4.1 Effects of Globalisation on Corporate Taxation[9]

In Table 1, results for the equilibrium specification of the corporate taxation model are summarised. Most importantly, the degree of integration of the countries in the world economy,

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[8] To acknowledge the fact that business-cycle effects can dominate the results of estimations when using annual data, we alternatively constructed five year time periods from 1967 to 1996. In doing so, we allow for flexible time lags between changes in macroeconomic conditions and the adjustment of tax rates. We find out that the results for the five-year period data set are very similar to annual time-series data. For that reason, we skip the results using five-year period data in the following.

[9] Since we have no effective average corporate tax rates for Austria and Greece, this analysis is only for Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and the United States.

Endogenous variable: **corptax** (equilibrium specification)					
Variable	(1)	(2)	(3)	(4)	(5)
const	40.84*** (4.24)	63.71*** (8.50)	63.08*** (8.79)	69.90*** (8.58)	64.04*** (8.49)
open	-19.10*** (7.86)	-19.26*** (7.52)	-19.47*** (7.71)	-15.80*** (7.52)	
size	0.0135 (0.02)	0.0138 (0.02)	0.0145 (0.02)	0.0180 (0.02)	
growth	-1.54*** (0.29)	-1.56*** (0.29)	-1.55*** (0.30)	-0.87*** (0.32)	-1.68*** (0.30)
gov		-2.46*** (0.84)	-2.50*** (0.88)	-1.89** (0.83)	-2.46*** (0.84)
capital			0.263 (1.21)		
surplus				-1.31*** (0.30)	
open(-1)					-22.71*** (7.59)
size(-1)					0.0134 (0.18)
Nr.obs.	303	303	303	303	303
n	12	12	12	12	12
R-sq					
within	0.0893	0.1077	0.1081	0.1685	0.1145
between	0.1531	0.3893	0.3767	0.2427	0.3762
overall	0.0949	0.2002	0.1951	0.1486	0.2020
Standard errors in parentheses; *, **, *** for significance at the 90, 95, 99% level (two-tailed test)					

Table 1

measured by *open*, has a significant negative impact on corporate taxes throughout. This result is very robust regarding changes of specifications and sample size. Consequently, we are able to support the theory of tax competition and the efficiency hypothesis with empirical evidence. In equations (1)-(4), the impact of *open* is implemented without a lag. In (5), *open* is lagged for one period. Then, the effect becomes even more significant. The second element of the basic model is the *size* of the economy. The sign of the variable in the estimated equations is correct, but the coefficient is never significantly different from zero. A one-period lag of the variable in (5) does not alter this finding. Here, the case of the US is especially remarkable, as this big country has relatively low corporate taxes, which cannot be explained in this approach. The impact of the *growth* variable on taxation is negative, as predicted, and significant. The variable for the centre of political gravity, *gov*, shows a very intuitive result. As the value of *gov* increases from far left to far right, a negative sign means that corporate taxes are lower, the more conservative the government and the legislative authorities are. Moreover, in this case, the negative sign is very robust and significance is given throughout. The variable *capital* was introduced to supplement the measurement of globalisation with a further proxy. However, the variable is not successful in this context. The same applies with the globalisation measures *openness2* and *diinvest*. *Surplus* represents the profits of firms. According to (4), it emerges that higher profits lead to lower taxation of enterprises, which is plausible given the budget constraint requirements.

Similar results are reported in Table 2 for the partial adjustment specification of the corporate tax model. The lagged endogenous variable is highly significant as could be expected. Moreover, the findings of the equilibrium specification can be sustained. Globalisation, growth, profits, and the political gravity index still have a negative and significant impact on corporate taxes. The performance of the variable *size* is not better, however. It is also worth noting that the qualitative index *capital* is now somewhat improved, but still not significant. Of course, the inclusion of the lagged endogenous variable improves the overall fit decisively. The overall determination coefficient now exceeds 0.7.

Endogenous variable: **corptax** (partial adjustment specification)					
Variable	(1)	(2)	(3)	(4)	(5)
const	9.17*** (1.69)	21.78*** (5.30)	24.51*** (5.62)	22.70*** (5.32)	21.87*** (5.30)
open	-4.93** (2.19)	-5.79*** (2.20)	-5.02** (2.26)	-5.79*** (2.19)	
size	-0.002 (0.003)	0.002 (0.003)	0.003 (0.003)	0.002 (0.003)	
growth	-0.50** (0.22)	-0.49*** (0.21)	-0.57*** (0.22)	-0.39* (0.22)	-0.51** (0.22)
gov		-1.31*** (0.52)	-1.20** (0.53)	-1.89** (0.83)	-2.46*** (0.84)
capital			-1.07 (0.74)		
surplus				-1.45*** (0.10)	
open(-1)					-5.96*** (2.22)
size(-1)					0.002 (0.003)
corptax(-1)	0.80*** (0.03)	0.78*** (0.03)	0.78*** (0.03)	0.77*** (0.03)	0.78*** (0.03)
Nr.obs.	297	297	297	297	297
n	12	12	12	12	12
R-sq					
within	0.5091	0.5157	0.5163	0.5180	0.5165
between	0.9829	0.9818	0.9859	0.9814	0.9814
overall	0.7181	0.7240	0.7260	0.7263	0.7243
Standard errors in parentheses; *, **, *** for significance at the 90, 95, 99% level (two-tailed test)					

Table 2

Endogenous variable: **labtax**					
Variable	(1)	(2)	(3)	(4)	(5)
const	37.22*** (2.06)	40.19*** (2.42)	36.88*** (2.47)	38.85*** (3.03)	40.20*** (2.40)
open	25.62*** (2.26)	24.76*** (2.22)	23.05*** (2.18)	24.74*** (2.46)	
size	-0.0142*** (0.001)	-0.0200*** (0.007)	-0.0177** (0.008)	-0.0165* (0.009)	
growth	-0.46*** (0.07)	-0.48*** (0.07)	-0.42*** (0.07)	-0.43*** (0.09)	-0.41*** (0.07)
gov		-0.26 (0.20)	-0.54*** (0.20)	-0.09 (0.24)	-0.27 (0.20)
capital			1.69*** (0.31)		
surplus				-0.11 (0.09)	
open(-1)					25.71*** (2.22)
size(-1)					-0.0201*** (0.007)
Nr.obs.	340	340	340	340	340
n	14	14	14	14	14
R-sq					
within	0.4098	0.4076	0.4576	0.1685	0.1145
between	0.3361	0.4094	0.4303	0.2427	0.3762
overall	0.3709	0.4351	0.4588	0.1486	0.2020
Standard errors in parentheses; *, **, *** for significance at the 90, 95, 99% level (two-tailed test)					

Table 3

4.2 Effects of Globalisation on Labour Taxes

According to the results given in Table 3, globalisation has a very clear and significant impact on labour taxes. However, as predicted for the relatively immobile factor by tax competition models, the effect is now positive in all estimated equations. Again, the result is robust regarding detailed specification and sample size. It is plausible to assume that some credit for this outcome can also be attributed to the compensation hypothesis. The sign of *size* has also changed compared to corporate taxes. This shows the requirement of countries to compensate increasingly for drops in tax corporate revenues, the smaller the countries are. The impact of *growth* is still negative, as the marginal product of labour and wages also increase after technical progress, which raises tax revenues *ceteris paribus*. It is also interesting to see that the political variable *gov* is still negative in sign. This means that the more conservative governments are, the lower they set labour taxes. However, the effect is not always significant. Again, the introduction of one-period lags for *open* and *size* does not change the results.

4.3 Effects of Globalisation on Social Insurance Programmes[10]

Finally, we examine the main statement of the compensation hypothesis. To do so, we have to analyse whether international integration leads to increasing social insurance programmes. The reason for the supposed changes is that an increased exposure to external risk raises the demand for insurance provided by the government. For this, we check the influence of globalisation, country size, growth, income-level and the rate of unemployment on the endogenous variable social expenditure. In this case, we report the result of the feasible generalised least squares procedure contained in the stata program. The result of the estimation is given by the following equation:

$$\begin{aligned} \text{socexp} = \; & \underset{(2.80)}{21.41\ \text{const}^{***}} + \underset{(1.43)}{6.48\ \text{open}^{***}} - \underset{(.002)}{.024\ \text{size}^{***}} - \underset{(.179)}{.529\ \text{growth}^{***}} \\ & + \underset{(.161)}{.185\ \text{ilevel}} + \underset{(.107)}{.252\ \text{unempl}^{***}} \end{aligned} \tag{8}$$

(Number of observations: 194, Number of countries: 13, R-sq within 0.71, between 0.32, overall 0.39)

As becomes evident from this result, globalisation has a positive and significant impact on social expenditures in the OECD countries considered. The outcome thus supports the

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[10] Due to lack of data this analysis covers only the time period from 1980 to 1995.

compensation view of globalisation for this part of government expenditures. As households in smaller countries tend to have higher risks when the economy is exposed to the world market compared to large economies, it is plausible that the impact of *size* is negative in this case. Again, the impact of *growth* is negative, meaning that a growing economy is perceived as a possible means of compensation on its own. According to the result, the per capita income level has no significant influence on social expenditure, while – as could be expected – unemployment is an important factor to determine the level of government expenditure.

5 Conclusions

Recent empirical studies find a positive impact of globalisation on capital taxes. These results contradict the theory of international tax competition, however. The present paper aims to clarify some problems of this potential paradox. For a panel of 14 OECD countries in the period from 1967 to 1996, we systematically examine the basic results of the tax competition literature. The empirical work is based on capital and labour taxation theory, controlling for country size effects. The results of the basic theoretical model are obtained with restrictive assumptions, which prevent an immediate application to empirical work. Therefore, we add further variables to capture the effects of dynamics, uncertainty and political preferences. By using effective corporate tax rates for capital taxation, our empirical model examines only a sub-group of capital tax competition. However, this procedure is justified as corporate tax-bases are much closer to the assumption of the theoretical model than other forms of capital taxes.

Our results are as follows. First, we find that national governments lower corporate taxes as a consequence of increased globalisation. Thus, in contrast to recent empirical studies, our empirical results support tax competition theory. The differences between our results and the results of recent studies are mainly caused by the use of different variables and model specifications. In particular, other measures for corporate taxation and openness have been adopted in this paper. These variables explicitly consider tax-base effects and avoid the bias of economy size. Second, as theoretical models of tax competition predict for the case of a given level of public goods, we find a significantly positive relation between globalisation and labour taxation. Third, we observe that governments' social expenditures are positively related to increasing globalisation as well. The change in the tax-mix from the rather elastic corporate tax-base to the comparatively inelastic labour tax-base supports the efficiency hypothesis of globalisation. On the other hand, the increase in social expenditures supports the

compensation hypothesis of globalisation. As a result, the efficiency and the compensation hypotheses are both relevant to explain government behaviour, the former for revenues, the latter for expenditures.

Appendix

variable	description	source	mean	standard deviation
endogenous				
corptax	effective average corporate tax rate	Genser et al. (2000)	37.25	15.42
labtax	effective average labour tax rate	Genser et al. (2000)	33.51	9.49
socexp	Social expenditure as a per-centage of GDP	OECD (1998b)	21.95	6.27
exogenous				
growth	growth rate of GDP meas-ured in PPP-US-dollar	own calculations	2.98	2.43
size	relative country size: adj. GDP (country) / adj. GDP (average)	own calculations	100	147.99
votigra	center of political gravity for electorate	Cusack (1997)	3	0.281
legigra	center of political gravity for legislature	Cusack (1997)	3.03	0.29
cabigra	center of political gravity cabinet	Cusack (1997)	3.1	0.72
gov	sum of votigra, legigra and cabigra	own calculations	9.13	1.18
ilevel	income level: adj. GDP / population	own calculations	14.31	3.77
openness1	(imports + exports) / GDP	own calculations		
openness2	see page 9	Quinn (1997)	11.23	2.41
capital	restrictions on payment and receipts of capital	Quinn (1997)	3.14	0.76
open	residuals from regression of *size* on *openness1*, see also page 10	own calculations	0	0.22
diinvest	investment abroad as a share of GDP	own calculations	1.25	1.35
surplus	operating surplus of corpo-rate and quasi-corporate enterprises as a % of GDP	own calculations; OECD (1998a and 1999)	11.01	5.37
unempl	Rate of unemployment	OECD (1999); Ch.: employment / Data-base: quarterly la-bour force statistics (**2501DSA)	5.37	3.17

If not especially indicated, data for calculations are taken from OECD (1999).

References

Bucovetsky, S (1991): *Asymmetric Tax Competition*, Journal of Urban Economics 30: 167-181.

Bucovetsky, S. and J.D. Wilson (1991): *Tax Competition with Two Tax Instruments,* Regional Science and Urban Economics 21: 333-350

Cameron D.R. (1978): The Expansion of the Public Economy: A Comparative Study, American Political Science Review 72(4): 1243–1261

Cusack, T.R (1997): *Partisan Politics and Public Finance: Changes in Public Spending in the Industrialized Democracies, 1955-1998*, Public Choice 91: 375–395

Garrett, G. (1995): *Capital Mobility, Trade and the Domestic Politics of Economic Policy, International Organisation* 49(4): 657–687

Garrett G. and D. Mitchell (1998): *International Risk and Social Insurance: Reassessing the Globalization-Welfare State Nexus*, unpublished working paper, Yale University

Genser, B, F. Hettich and C. Schmidt (2000): *Messung der effektiven Steuerbelastung – eine vergleichende Analyse für Deutschland, Österreich und ausgewählte OECD Staaten*, DFG-Projektbericht, mimeo, January, Universität Konstanz

Keen, M. (1997): *Simple Rules for the Optimal Taxation of International Capital Income*, Scandinavian Journal of Economics 99:447–461

Leiner, N. (1998): *Internationale Migration: Konsequenzen für die Einkommensverteilung und öffentliche Güter*, Deutscher Universitätsverlag

Mendoza, E.G., A. Razin und L. Tesar (1994): *Effective Tax Rates in Macroeconomics: Cross–Country Estimates of Tax Rates on Factor Income and Consumption*, Journal of Monetary Economics 34: 297–323

OECD (1998a): *Revenue Statistics 1965–1997*, Electronic Edition on Microcomputer Diskettes, Organisation for Economic Co–operation and Development, Paris

OECD (1998b): *Social Expenditure Data*, Electronic Edition on CD Rom, edition 02/1998, Organisation for Economic Co–operation and Development, Paris

OECD (1999): *OECD Statistical Compendium, National Accounts 1965–1996*, Electronic Edition on CD Rom, edition 01/1999, Organisation for Economic Co–operation and Development, Paris

Quinn, D. (1997): *The Correlates of Change in International Financial Regulation*, American Political Science Review 91(3): 531–551

Rodrik, D. (1997): *Trade, Social Insurance, and the Limits of Globalisation,* NBER Working Paper 5905 (Cambridge)

Rugie, J.G. (1983): *International Regimes, Transactions and Change: Embedded Liberalism in the Postwar Economic Order*. In S.D. Krasner: *International Regimes*, Ithaca, Cornell University Press

Schulze, G.G. and H.R. Ursprung (1999): *Globalisation of the Economy and the Nation State*, The World Economy 22(3): 295-352

Sørensen, P.B. (1995): *Changing views of the corporate income tax*, National Tax Journal 48, 279-295

Swank, D. (1998): *Funding the Welfare State: Globalisation and the Taxation of Business in Advanced Market Economies*, Political Studies XLVI: 671-692

Tanzi, V. and L.A. Bovenberg (1990): *Is there a need for harmonizing capital income taxes within EC countries?* In: H. Siebert (Hrsg.): *Reforming Capital Income Taxation*, 171-197, Mohr, Tübingen

Wilson J.D. (1986): *A Theory of Interregional Tax Competition*, Journal of Urban Economics 19: 296-315

Wilson J.D. (1991): *Tax Competition with Interregional Differences in Factor Endowments*, Regional Science and Urban Economics 21: 423-451

Wilson J.D. (1999): *Theories on Tax Competition*, National Tax Journal 52(2): 269-304

Zodrow G.R and P. Mieszkovsky (1986): *Pigou, Tiebout, Property Taxation and the Underprovision of Local Public Goods*, Journal of Urban Economics 19: 356-370